Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Amended): A digital telemetry system having improved data rate and robustness, comprising:

a data transmission cable having a first end and a second end, and capable of transmitting data on at least two propagation modes;

a data source connected at the first end and having data transmission circuitry to generate data signals on the at least two propagation modes;

a receiver connected to the second end whereon the receiver receives signals on a first and second of at least two propagation modes and having

a processor ~~a first receive circuitry to receive signals on a first of the at least two propagation modes;~~

~~a second receive circuitry to receive signals on a second of the at least two propagation modes;~~ connected to a storage medium storing instructions directing the processor to execute

an adaptive far-end cross-talk cancellation ~~circuitry connected to the first receive circuitry and to the second receive circuitry~~logic for canceling cross-talk that occurs between the first and second propagation modes.

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2. (Amended): The digital telemetry system of Claim 1, wherein the adaptive far-end cross-talk cancellation ~~circuitry~~ logic comprises:

a first propagation mode cross-talk adjustment ~~circuit~~ logic ~~connected~~ to direct the processor to receive samples on a first propagation mode and having ~~circuitry~~ logic to direct the processor to accept samples from a second propagation mode wherein the first propagation mode cross-talk adjustment ~~circuit~~ logic directs the processor to adjusts the samples on the first propagation mode by values that are a function of the samples of the second propagation mode.

3. (Amended): The digital telemetry system of Claim 2, wherein the far-end adaptive cross-talk cancellation ~~circuitry~~ logic further comprises instructions to cause the processor to:

determine a slice residual ~~determination logic connected to~~from the output of the cross-talk adjustment ~~circuit~~logic;

update a cross-talk parameter ~~update logic connected to receive~~from the slice residual ~~from the slice residual determination logic and connected to the cross-talk adjustment circuit~~.

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4. (Amended): The digital telemetry system of Claim 2, wherein the far-end adaptive cross-talk cancellation ~~circuitry~~ logic causes the processor to accepts as input one value on each of a plurality of carriers and to computes the cross-talk component for each carrier.

5. (Amended): The digital telemetry system of Claim 4, wherein the far-end adaptive cross-talk cancellation ~~circuitry~~ logic directs the processor to compute ~~computes~~ the cross-talk component for each carrier by multiplying the signal received on the second propagation mode by a carrier specific coefficient.

6. (Amended): The digital telemetry system of Claim 5, wherein the far-end cross-talk parameter update logic directs the processor to updates each carrier specific coefficient as a function of the slice residual on such carrier.

7. (Amended): The digital telemetry system of Claim 5, wherein the far-end cross-talk parameter update logic directs the processor to updates each carrier specific coefficient by applying the equation:

$$CXYi = CXYi + \\ AlphaFEXT * (< CEXi, CEXi > / REF\_MAGN^2) * < TXFFT\_out[i], TYresidual[i] >$$

where

CEXi is the frequency domain equalizer coefficient for the ith carrier of propagation mode X;

CXYi is the cross-talk cancellation coefficient for the ith carrier for cancelling far-end cross-talk from propagation mode X to propagation mode Y;

AlphaFEXT is a constant for balancing the tracking speed of CXYi against the stability of the value of CXYi;

REF_MAGN is the Root Means Square (RMS) magnitude of the reference data points;

TXFFT_out[i] is the frequency domain data point on the ith carrier on propagation mode X;

TYresidual[i] is the slice residual for the ith data point on the Y propagation mode.

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8. (Amended): The digital telemetry system of Claim 2, wherein the far-end cross-talk adjustment ~~circuit~~ logic directs the processor to ~~receives~~ receive *m* samples from the second ~~receive circuitry~~propagation mode and ~~convolves~~ convolve these using *m* coefficients.

9. (Amended): The digital telemetry system of Claim 8, wherein the storage medium further stores instructions comprising a slice determination logic and a

coefficient update logic ~~wherein~~ directing the processor to adjust the *m* coefficients ~~are adjusted~~ as a function of a slice residual determined by the slice determination logic.

10. (original): The digital telemetry system of Claim 9, wherein the *m* coefficients are adjusted using the equation:

$$CXYi = CXYi + AlphaFEXT * (< CEXi, CEXi > / REF\_MAGN^2) * < TY_{(n-i)}, TXresidual >$$ where,

CEXi is the *ith* time domain equalizer coefficient of propagation mode X;

CXYi is the *ith* cross-talk cancellation coefficient for canceling far-end cross-talk from propagation mode X onto propagation mode Y;

TYj is the *jth* sample from the second receive circuitry coefficient of propagation mode Y;

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TXResidual is TXCorr - TXIdealPoint

where TXCorr is the cross-talk corrected output from the cross-talk adjustment circuit and TXIdealPoint is an ideal constellation point for propagation mode X; and

AlphaFEXT is a constant between 1 and 0.

11. (original): The digital telemetry system of Claim 10, wherein AlphaFEXT is in the range 0.001 to 0.00001.

12. (Amended): A method of digital telemetry having improved data rate and robustness by canceling far-end cross-talk from a near-lying propagation mode, comprising:

inputting a first sample received on a first propagation mode;

inputting a second sample received on a second propagation mode;

determining a cross-talk component from the second sample on the first sample; and

determining an output by subtracting the cross-talk component from the second sample from the first sample.

13. (original): The method of digital telemetry having improved data rate and robustness by canceling far-end cross-talk from a near-lying propagation mode of Claim 12, further comprising:

determining the slice residual; and

adjusting a function used to determine the cross-talk component as a function of the slice residual.

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14. (original): The method of digital telemetry having improved data rate and robustness by canceling far-end cross-talk from a near-lying propagation mode of Claim 13, wherein the cross-talk component is determined by multiplying a carrier specific coefficient with a sample received on a corresponding carrier on the near-lying propagation mode.

15. (original): The method digital telemetry having improved data rate and robustness by canceling far-end cross-talk from a near-lying propagation mode of Claim 14 wherein the coefficients are updated by applying the function:

$$CXYi = CXYi + AlphaFEXT * (< CEXi, CEXi > / REF\_MAGN^2) * < TXFFT\_out[i], TYresidual[i] >$$

where

CEXi is the frequency domain equalizer carrier for ith carrier of propagation mode X;

CXYi is the cross-talk cancellation coefficient for the ith carrier for canceling far-end cross-talk from propagation mode X to propagation mode Y;

AlphaFEXT is a constant for balancing the tracking speed of CXYi against the stability of the value of CXYi;

REF_MAGN is the RMS magnitude of the reference data points;

TXFFT_out[i] is the frequency domain data point on the ith carrier of propagation mode X;

TYresidual[i] is the slice residual for the ith data point on the Y propagation mode.

16. (Amended): A method of digital telemetry having improved data rate or robustness by canceling far-end cross-talk from a near-lying propagation mode, comprising:

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inputting a first set of samples received on a first propagation mode;

inputting a second set of samples received on a second propagation mode;

determining a cross-talk component by convolving the second set of samples; and

determining an output by subtracting the cross-talk component from a first sample on the first propagation mode.

17. (original): The method of Claim 16 wherein the convolving comprises multiplying each sample in the first second set of samples by a coefficient.

18. (original): The method of Claim 17 further comprises:

determining a slice residual between the output and an ideal point;

adjusting the coefficients as a function of the slice residual.

19. (original): The method of Claim 18 wherein the coefficients are adjusted by the equation:

$$CXYi = CXYi + AlphaFEXT * (< CEXi, CEXi > / REF\_MAGN^2) * < TY_{(n-i)}, TXresidual >$$ where,

CEXi is the ith time domain equalizer coefficient for propagation mode X;

TYj is the *jth* sample from the second receive circuitry of propagation mode Y;

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TXResidual is TXCorr - TXIdealPoint

where TXCorr is the cross-talk corrected output from the cross-talk adjustment circuit and TXIdealPoint is an ideal constellation point for propagation mode X; and

AlphaFEXT is a constant between 1 and 0.

20. (original): The method of Claim 19 wherein AlphFEXT is in the range 0.001 to 0.0001.